Claims

1. A data collector, comprising

a housing,

a vibration signal input on said housing,

an analog to digital converter within said housing connected to said vibration signal input, converting a vibration signal received at said vibration signal input to a digitized vibration signal,

an optical system within said housing, said optical system receiving light from outside said housing,

a receiver circuit converting said received light to a digital signal, and

a digital signal processing circuit connected to said analog to digital converter and said receiver circuit, and receiving, storing or processing said digitized vibration signal and/or said digital signal converted from said received light, for the purpose of predictive maintenance.

2. The data collector of claim 1 wherein said optical system further comprises a light source emitting light through an aperture in said housing for reflection and return to said optical system.

3. The data collector of claim 2 wherein said light source comprises a laser light source.

4. The data collector of claim 3 wherein said laser light source comprises a laser diode and a collimating lens, said collimating lens collimating diverging light from said laser diode to a collimated light beam emitted from said housing.

5. The data collector of claim 2 wherein said receiver circuit comprises a light detector for detecting reflected light, and said optical system further comprises a beam splitter positioned to direct reflected light received through said aperture to light detector, said beam splitter positioned between said light source and said aperture.

6. The data collector of claim 1 wherein said receiver circuit comprises a PIN diode for converting received light to an electrical signal.

7. The data collector of claim 6 wherein said receiver further comprises a threshold comparator for comparing current flow in said PIN diode to a threshold, and producing a digital signal to said digital signal processing circuit when said threshold is exceeded.

8. The data collector of claim 7 wherein said digital signal processing circuit computes a rate of rotation of a moving element in response to timing of said digital signal from said threshold comparator, whereby said optical system is usable as a laser tachometer.

9. The data collector of claim 6 wherein said optical system further comprises a filter positioned between said aperture and said PIN diode, said filter filtering light other than at a wavelength of said light source.

10. The data collector of claim 1 further comprising a storage device, said digital signal processing circuit storing said digitized vibration signal in said storage device.

11. The data collector of claim 2 further comprising a display and input keys, said digital signal processing circuit displaying operational information on said display and receiving operational instructions from an operator via said input keys.

12. The data collector of claim 1 wherein said housing is sized to fit in a single hand of an operator.

13. A method of collecting data for the purpose of predictive maintenance using a data collector, comprising

receiving a vibration signal into a housing of said data collector, and converting said a vibration signal to a digitized vibration signal withing said housing,

receiving light from outside said housing into said housing, and converting said received light to a digital signal, and

receiving, storing or processing said digitized vibration signal and/or said digital signal converted from said received light.

14. The method of claim 13 further comprising generating light within said housing and emitting said light through an aperture in said housing for reflection and return.

15. The method of claim 14 wherein said light comprises laser light.

16. The method of claim 15 wherein said laser is generated by a laser diode and a collimating lens, said collimating lens collimating diverging light from said laser diode to a collimated light beam emitted from said housing.

17. The method of claim 14 wherein said light is received by a light detector for detecting reflected light, and further comprising positioning a beam splitter to direct reflected light received through an aperture in said housing to said light detector, said beam splitter positioned between said light source and said aperture.

18. The method of claim 13 wherein said light is received by a PIN diode and converted thereby to an electrical signal.

19. The method of claim 18 further comprising comparing current flow in said PIN diode to a threshold, and producing a digital signal when said threshold is exceeded.

20. The method of claim 19 further comprising computing a rate of rotation of a moving element in response to timing of said digital signal resulting from said threshold comparison.

21. The method of claim 18 further comprising positioning a filter between said aperture and said PIN diode, said filter filtering light other than at a wavelength of said light source.

22. The method of claim 13 further comprising storing said digitized vibration signal in a storage device.

23. The method of claim 14 further comprising displaying operational information on a display on said housing, and receiving operational instructions from an operator via input keys on said housing.

24. The method of claim 13 wherein said housing is sized to fit in a single hand of an operator.